JPRS-ESA-84-005

9 February 1984

East Europe Report

SCIENTIFIC AFFAIRS

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OPERATIONS OF GEOPHYSICAL OBSERVATION STATIONS

Sofia VECHERNI NOVINI in Bulgarian 12 Nov 83 p 4

[Report on interview with Dimitur Samardzhiev, director of the Geophysics Institute of the Bulgarian Academy of Sciences, by Petur Vladev: "Geophysical Observation Stations"; at the institute, date not given]

[Text] In the office of Senior Scientific Researcher Dimitur Samardzhiev, director of the Geophysical Institute of BAN [Bulgarian Academy of Sciences] hangs a relief map of Bulgaria. Twenty or so red labels have been pasted on it bearing the name of some nearby settlement. These form a dense network in Southern Bulgaria, while there are only two labels in Northern Bulgaria. It turned out that each symbol represents the location of a geophysical station. Geophysics is a complex of sciences, and therefore these stations are designed for making observations of various natural phenomena. Some of them, in addition, are not narrowly specialized but carry on a number of different activities.

This map provided us with a topic for a spontaneous discussion. We learned that the labels reflect a complex scientific organization, the essence of which Samardzhiev began to discuss:

"One of the basic tasks of our institute is the continuous observation of the geophysical fields. The map indicates the stations at which these fields are continuously recorded. The most important of these is seismicity.

"Our country, as we know, is in an earthquake region, and we observe here a number of seismic foci, which must be kept under constant observation. A network of seismic stations has been constructed in our country in order to implement governmental and party decisions and resolutions of BAN. These stations are located in different seismic regions. The information recorded by the stations is transmitted to the central desk at the Geophysics Institute, where the incoming information is monitored round-the-clock. When an earthquake occurs, the central desk locates the epicenter, its depth and energy.

"The second field is the earth's magnetic field. The station which records its natural fluctuations is in Panagyurishte. This station also performs surveys related to the extremely important areas of archeomagnetism and

paleomagnetism. In recent years much attention has been devoted to paleomagnetism, the data on which can be used to reach conclusions on tectonics and the movement of the earth's crust. Many processes occurring in the earth's core and on its surface are related to geomagnetism.

"The third field which we observe is the ionosphere. It shields us from the particles radiated from within the sun."

[Question] Do the observations from these stations serve only for accumulating information?

[Answer] Yes, this is a very important element in geophysics. There are fields which can change in a matter of hours, while others change over a period of years. Geomagnetism can even vary over centuries. It is therefore essential to perform continuous observations and to gather information.

The ionosphere is a part of the atmosphere whose lower boundary is at an altitude of 50 km above the earth's surface. It contains a large number of free ions and electrons. The ionosphere reflects short, medium, and long wavelengths and makes possible the diffusion of radio waves.

In order to study the ionosphere, several stations in Sofia and in the region of the city of Michurin are equipped to conduct vertical probing. These stations give us coverage of the entire territory of our country. At every moment we are monitoring the state of the ionosphere, i.e., the altitude of the ionized strata and their electron concentration.

The practical aspect of these studies is the solution of problems in connection with radio broadcasting. The other, purely scientific aspect makes it possible for us to investigate the problem of interactions between the sun and the earth. Solar radiation ionizes the atoms and molecules of the atmosphere and as a result of this the ionosphere is formed. By studying these concentrations in time and space we can provide an answer to the question of interaction between solar radiation and the earth's atmosphere and of the transmission of energy from the sun through interplanetary space and the atmosphere as well as the transformation of this energy. This question is an important one, and much work is currently being done on it.

[Question] What sort of consequences can disruptions of the ionospheric stratum have for our planet and for mankind?

[Answer] When storm currents of particles--electrons and protons--are radiated outward from the sun and come into contact with the atmosphere, they cause so-called magnetic storms and, as a result, ionospheric storms. The state of the ionosphere is disrupted and at such times radio transmissions are interrupted. Depending on the force of the storm, this can continue for minutes or for hours.

The other important problem, that of the effect of the magnetic field and the ionosphere on the human organism, can be elucidated through comprehensive studies involving the joint participation of medical researchers and biologists.

At present many of our studies are concentrated on developing ways to make geophysical forecasts of earthquakes. We have just begun to observe a larger number of geophysical phenomena and processes.

[Question] Can you tell us something about the more important achievements resulting from the information collected so far by the geophysical stations?

[Answer] We have solved a number of problems, both in the area of the spread of seismic waves and the physics of foci as well as in the area of geomagnetism. I will mention here the solution of what we refer to in geophysics as inverse problems--the inverse geomagnetic problem, the inverse gravimetric problem, etc. Inverse problems are being solved in the areas of the ionosphere and radio waves and can be used in developing practical applications. In the area of geomagnetism in particular inverse problems enable us to detect factors which disturb the magnetic field, or, put differently, the presence of useful ores and mineral deposits.

[Question] Does the detection of factors which disturb the magnetic field have any practical application in our country?

[Answer] The value of the magnetic field on the earth's surface is known. If we detect any anomaly, this is due to [the presence of] some bodies or masses which produce disturbances of this magnetic field. By solving the inverse problem, we can determine the body which causes the disturbances. We have suggested such methods to the enterprise for geophysical exploration, which is applying them in prospecting for deposits of useful ores and minerals.

Observations of the ionosphere are of practical significance primarily in improving forecasts about the diffusion of radio waves, both in the territory of Bulgaria and for radio communications with other, distant, countries.

[Question] Are there any plans for some sort of development of the existing network of geophysical stations?

[Answer] We plan to construct forecasting ranges in Sofia and Plovdiv. In this way we can cover a large region characterized by increased seismicity. A forecasting range means an area which is under special observation, in which the different geophysical fields will be recorded--the magnetic, electrical, and geochemical fields. Observations will be made of the intensity of the mineral water sources, the composition and water temperature, etc. We hope by the use of this comprehensive method to solve the problem of predicting earthquakes in the regions of Sofia and Plovdiv. The application of this comprehensive method will involve all areas of research of our institute.

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DEVELOPMENT OF COMPUTER TECHNOLOGY EXAMINED

Conference Devoted to Microprocessors

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 pp 1, 4

[Article by Engineer Yulian Danchev: "Microprocessors Are the Order of the Day"]

[Text] The Sixth National Scientific and Technical Conference on Computer Technology, held in Plovdiv 17 to 19 November 1983, with broad international participation, attracted the attention of specialists by the interesting topics discussed in over 100 papers. It had as its basic theme microprocessor systems, and it was organized by the Central Council of the Scientific and Technical Union--the Central Management of Electronics, Electrical Engineering, and Communications Union, the State Committee for Scientific and Technical Progress, and the Ministry of Machine Building and Electronics. This fact itself tells about the stage of development in our computer technology as a science and as an industry.

If we were to summarize the results of the conference, we would have to point out that it made an attempt to recapitulate what has already been achieved, in terms of products actually adopted in production, using microprocessors, and scientific research and development as well--as a necessary sector which could guarantee the further development of our electronic industry. As a matter of fact, it became clear from the papers that the development of not only electronics but also of a number of other industries depends on this sector, because microprocessors are already being established, permanently, so it seems, in all spheres of our economic and social life.

The work of the conference took place in five panels: 1) Organization, Structure, Elements, and Design of Microprocessor Systems; 2) Algorithms, Calculations, Models, and Data Processing with Microprocessor Systems; 3) Microprocessor Application; 4) Microprocessor Systems Software; 5) Control, Diagnosis, Reliability. Thus all aspects of application and theory which relate to the work conducted in the field of computer technology in Bulgaria were actually covered.

Because of the nature of the topic, the work in panel No 1, Organization, Structure, Elements, and Design of Microprocessor Systems, was carried out

in a most theoretical way. The discussion of the problems related to the establishment of multimicroprocessor systems aroused particular interest. This is quite natural, if we take into account that automated systems built on microprocessors are essential to the future of automation. In this respect, the papers devoted to multimicroprocessor systems organized on the basis of a general main frame, multiprocessor systems with flow control of the computing process, and others, especially stood out. There were quite a few papers on information storage and the organization and structure of storage devices in the aspect of specific particularities of microprocessor applications.

In addition to the papers devoted to methods and devices designed for industrial use, a number of problems from the "kitchen" of computer technology were examined. More specifically, the questions of automated design of microprocessor systems and devices should be mentioned. The existing means for automation of the design process, and their use in its different stages, were examined and analyzed. Particular attention was devoted to the possibilities for microprocessor integration of different sets into one system. An attempt was made to define the requirements for automated microprocessor design systems according to their structure, and on this basis to formulate recommendations for choosing the design system according to the specific use. At the same time it was made clear that, unlike the design of other electric products, in microprocessor systems a significant amount of the time necessary for design (sometimes up to 80%) is used to design programs. Consequently, the attitude toward the design of microprocessor systems should be radically different from the traditional concepts of design in general. This has a significant impact not only on the method of its organization and continuation, but on the very methods of design as well.

The work of panel No 2, Algorithms, Calculations, Models, and Data Processing with Microprocessor Systems, was also of certain interest, although for a smaller but highly specialized group of people attending. A total of 18 papers presented dealt with this rather special topic from different points of view, but they were all linked by one thing: a trend toward further simplification of the procedures and methods of data processing by significantly accelerating and rationalizing the computing process with the aid of algorithmic and software means. This trend logically follows from the very nature of microprocessors, whose appearance made it possible to realize in practice more complex architectures by simplifying the design and the software.

The work of panel No 3 was no doubt the most interesting because it dealt with microprocessor application. All of the 30 papers presented attracted the attention of a significant number of participants and guests at the conference. Naturally, descriptions and analyses of microprocessor systems already created in Bulgaria, and their application, were found in these papers. It is necessary to mention that, in addition to the description and investigation of a number of industrial applications, papers were devoted to more specialized systems designed for automation of psychological research, biopool control, control of power-mass-spectrum analyses conducted onboard satellites, as part of scientific experiments. The existence of such topics

in itself outlines those peaks of development which were obviously impossible to talk about only a few years ago.

The presence of papers devoted to the application of microcomputers in the educational process should in particular be stressed. Interesting and very promising educational applications of the Bulgarian IMKO-1 and IMKO-2 personal computers at the V. I. Lenin Higher Machine-Electric Institute in Sofia were presented. It was announced that by using them there has been achieved a significant intensification of chemistry laboratory training in modeling complex chemical processes, transitory processes in automated control systems, and also in analyzing intricate subordinations with a comparatively large amount of computing operations. It was explained that IMKO-2 is particularly suitable for automated control and education in curriculum research and independent work of the students, organized on the principles of the task (problem) approach.

Continuous improvement of the microprocessor systems' apparatus capabilities permits the incorporation of more and more powerful program products in their system software, the creation of improved operating systems and using high level algorithmic languages. The participants in panel No 4, Microprocessor Systems Software, concentrated their attention on the examination of this and other software problems. The 30 papers presented discussed questions of the architecture of operating systems with multimicroprocessor design configuration, on-line operational systems, as well as software realization of some better known microprocessor systems.

Only 8 papers--the smallest number of papers--were presented by the participants in panel No 5, Control, Diagnostics, Realiability. Apparently the new trends in the theme of quality, which has powerfully affected our whole society, have not yet sufficiently captured the minds of scientific workers and specialists in the area of computer technology. And it should be known that precisely quality and reliability still remain the Achilles' heel of our computer technology, which as a matter of fact was heard within the context of many other papers presented, not only in panel No 5.

A characteristic feature of the work in this panel was the fact that almost all of the papers dealt with the problem of testing and quality certification of the finished products and input control of the built-in components. The question of ensuring high reliability of the products still in the process of design and the related problems, from the applicational and the theoretical point of view, have remained unnoticed by those groups with obviously low numbers of scientific workers, development units, and production engineers. The problems of providing high operating reliability, especially with respect to microprocessors designed for automation of technological processes, for integrating the CPU in operations and machines were not discussed.

Although it was undoubtedly successful, the Sixth Scientific and Technical Conference was accompanied by other weaknesses as well, and it would be useful to mention the most substantial ones. First of all, there was an evident tendency for most of the panelists to treat and point out mostly

the theoretical aspects of the problems examined. In most cases this was a theoretical interpretation of methods and devices with practical orientation, which is a true interpretation, though not always necessary. There were, however, theoretical papers that sounded rather like theory for theory's sake.

The fact that, with a few exceptions, the panelists were young and even very young scientific workers, mainly from the institutes of the Bulgarian Academy of Science and the Central Computer Equipment Institute, says that our eminent scientific workers, chiefs, and specialists in computer technology did not find it necessary to participate in the conference. Their absence was felt, both in terms of the panelists as well as the audience, making exceptions only for those few people who presided at the conference.

The Sixth National Scientific and Technical Conference on Computer Technology was a true and complete reflection of the scale of the work begun in Bulgaria in the area of microprocessor systems. Its results will no doubt give new incentives for the theoretical and practical application of this leading scientific and technical field.

New ESTEL System

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 5

[Article by Engineer Dimitur Atanasov: "The Development of ESTEL"]

[Text] The ESTEL complex of functionally compatible programs and hardware, designed for communications control between the central computer and a number of separate terminals and other computing devices, is under constant development. It could be said that it received fresh stimuli with the appearance and widespread application of microprocessor equipment which has expanded the capacities of telecommunication systems many times over. This was proved by the latest version of ESTEL, the production implementation of which strengthens even more our country's position as one of the leading nations in teleprocessing systems between the countries participating in the development of Uniform Series (US) and Mini Series (MS) Electronic Data Processing Machines (EDPM's).

A new ESTEL 4 system with two modifications, ESTEL 4.1 and ESTEL 4.2, was added to the ESTEL 2 teleprocessing system which has already been adopted for production. With them, new principles of operation, new hardware, program products, and exchange procedures were implemented in the practice of data teleprocessing.

From the point of view of the consumers' interests, these two modifications can be defined as follows:

The ESTEL 4.1 is designed to create small and average size terminal networks which should include up to 255 semiduplex channel interfaces. In this case, the teleprocessor operates under the control of an emulation program and only start-stop terminals are used.

The ESTEL 4.2 is used for the creation of average size and large terminal networks which consist of no more than 352 semiduplex channel interfaces. The teleprocessor operates under the control of the PUST program and start-stop, BST's and SDLT's terminal are used.

The hardware and software, which are used as a basis for creating the ESTEL 4.1 teleprocessing system, are part of the nomenclature for computing facilities from the Uniform Series--the ARRAY 1 stage. All of them are manufactured in our country and are distinguished by high technical, economic, and operating indicators. A large number of consumer application systems, various types of problem-solving complexes and automated control systems could be built with their aid. A characteristic feature of the ESTEL 4.1 is that it works with two operating systems--OS/US and DOS/US, with telecommunication access BTAM/OS/US and BTAM/DOS/US, as well as with KTAM/DOS and KTAM/OS. It is supplied with a large package of applications--VZOR/OS, TEKS/OS and DTS/DOS. It consists of a US 8371 data teleprocessor, start-stop, printing, digital and video terminals, and others. The system is supplied with powerful error detection programs which make off-line and complex mode testing of the devices possible.

The ESTEL 4.2 is a realization of the concept for network teleprocessing. The hardware and software on the basis of which it is built are part of the nomenclature of the Uniform Series EDPM ARRAY 2 and the Miniseries EDPM. All of its hardware and software are manufactured in the Bulgarian People's Republic, as is the case with the ESTEL 4.1. It is characterized by a virtual memory storage of the central data processor, OS/VS virtual operating system, and VTAM/OS/VS virtual telecommunication access. The terminal network is built on intelligent terminal devices which have broad functional capacities. The effectiveness of the data transmission is very high from a technical and economic point of view. The ESTEL 4.2 is designed to create problem-solving complexes, automated control systems, and most of all to build a computer network with a high computing potential, large primary storage, and external core memory. In addition to the US 8371 data teleprocessor and terminal with various purposes and different designs, terminal posts for US 9003 and US 9005 magnetic tape data preparation, an IZOT 1016S universal minisystem with an SM-4 central data processor are included in the complex.

Thus the central data processor is freed from the necessity of carrying out all of the computing work, which contributes to a signficant degree to increasing the data processing rate, facilitating the access, and ultimately to increasing the economic effectiveness of using electronic data processing machines.

The creation and implementation of the ESTEL 4.1 and the ESTEL 4.2 in regular production is a tremendous success for Bulgarian computer technology, which will no doubt achieve further development in the subsequent versions of the ESTEL teleprocessing system.

IZOTRING Network

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 5

[Article by Engineer Dimitur Atanasov: "IZOTRING--A Local Network"]

[Text] The trend of allocating EDPM computing resources, in case data processing is needed and command impulses are to be generated for scattered information sources, began its particularly successful realization with the appearance and development of microcomputers. Their compact and universal character, combined with a high reliability, permits the establishment of computing networks, which would include actually all possible dispersion that exists in practice. IZOTRING, created by the Central Institute for Computer Equipment in Sofia, is such a network.

IZOTRING is capable of including and combining into one uniform computing complex computers of different kinds and capacities, terminals and other computing means. The network itself, if we take into account the physical environment for information transferral, consists of coaxial cable. All computers, terminals and so forth can be hooked up in random places in the network by the communication adapter type IZOT 85025. The number of adapters, which also determines the number of users in the network, can go up to 256. All of them could be scattered to a distance of 5 to 6 kilometers. The only, and sufficient, condition which makes the hookup of any station to the system possible is that it have interface PS232.

The rate at which data are transferred along the physical line is 125 kilobits per second, and the rate at which the communication adapters can operate is from 300 to 9600 bits per second. The data exchange procedure is asynchronous (start-stop), and the adapter's schematic design is such that it allows the assignment of different exchange parameters--for example, the exchange rate could be 300, 600, 1200, 2400, 4800 and 9600 bits per second. The size of the symbols could also be controlled--5, 6, 7, or 8 bits.

IZOTRING is particularly suitable for use in scientific institutions, design institutes, and other places where it is important that each user be able to establish contact and exchange information from his own station with every other user, to manipulate data stored in the memory by his storage devices. In addition, each user could use his own language and program. All of this is made possible by the communication adapter, which is constructed entirely with Bulgarian-made elements. The complete generality which has been achieved through its use, including computing means of different kinds of manufacture and design, makes the system flexible and promising.

IZOT 1036S Personal Computer

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 5

[Article by Engineer Dimitur Atanasov: "A New Personal Computer"]

[Text] After IMKO-1 and IMKO-2, our electronics industry has started to adopt a new personal computer, the IZOT 1036S, created by the Central

Institute for Computer Equipment in Sofia. It is designed to be broadly used by scientific research and design institutes, commercial and administrative institutions, higher education institutions, and others. Its main configuration includes a microprocessor with 240K operations per second capacity, screen display, keyboard, and one or two minidisk storage devices. A printer, one or two fixed magnetic disk storage devices with 10 megabyte capacity, and a communication adapter for linking it with other computers and computing devices could be attached additionally to the processor. Its operating memory capacity is 64-256 kilobytes with a possible expansion up to 544 kilobytes. The size of the screen display is 250 lines of 80 symbols, and the keyboard is alpha-numeric.

The software of the IZOT 1036S uses a disk operating system (DOS) or an SPIM operating system. The consumer can use the following languages: BASIC, ASSEMBLER, PASCAL and COBOL. Word processing, financial planning, and accounting programs are included, as well as maintenance programs for synchronous and asynchronous communications.

The IZOT 1036S makes the effective automation of engineering and administrative labor, scientific research and design possible. It is expected that it will find broad application in high school education and higher education institutions.

Future Emphasis on Programming

Sofia TEKHNICKESKO DELO in Bulgarian 3 Dec 83 p 6

[Article by Engineer Andrey Nedyalkov: "How Will Programming Develop?"]

[Text] According to a certain forecast which covers the next few years to the first decades of the 21st century, the main efforts in the field of programming will be directed toward increasing the effectiveness of programmers. The search for a new approach (path) toward the programming process is already under way. Experiments are being conducted in order to create systematic procedures which would include the whole process--from formulating specifications to implementing the program product. Such systematic procedures already exist, although in a limited quantity.

The new software created is, by and large, a development of existing models. These are word processors and compilers, as well as a multitude of standard programs (utility programs). All of the above will become more universal, that is, it will be possible to use them on a larger number of different EDPM's.

It is expected that the new achievements will take place in the application of algorithmic languages as well. The forecasts point out that, in addition to the well-known and widespread languages such as COBOL, FORTRAN and PLD, the new ones, PASCAL and ADA, will also be widely used. The languages will include error detection routines which will increase the program's operating productivity significantly. The procedure-oriented languages, also called ultra-high level languages, will begin to operate with a data

base. This will enable even nonprogrammers to formulate inquiries and to work with a data base. In the near future screen display and other terminals will be installed, which will immediately increased the effectiveness of program development. The interrelationship among different programmers, who are equipped with similar electronic devices, will no doubt improve.

An important goal that must be achieved is improving the interrelationship between the users and those who create the software. Special facilities will make it possible for nonprogrammer users to participate in development at all stages of the programming complex, and in discussions about all different, intermediate versions of the programs they will be using.

Considerable changes are expected in the period up to the year 2000. The various steps in program development will be more widely automated. The following main trends of development are now being outlined: first, development of specialized program complexes; second, automated generation of machine programs on the basis of specifications made by ultra-high level languages; and third, development of new, improved algorithmic languages.

The use of large, standard component programs will increase sharply. Thus, substantive changes will take place in the programmer's work. He will complete the program by using ready blocks and will program modules independently, but to a significantly lesser extent. Component program libraries will be widely used.

A fact of great importance for ensuring a maximum increase in programming labor productivity, with significantly higher quality in the programs, is that the software will evolve into software-hardware units. They are expected to appear by the end of the 1980's and even the beginning of the 1990's. Because during this period (by the end of the year 2000), the natural languages are not expected to be used (though there will probably be some isolated cases of using them), the forecast is for an increase in "consumption" of the most perfected languages, PASCAL and ADA. Several derived languages, specializing in concrete applications, should be created on this basis.

When we speak of the time after the year 2000, everything is rather conditional and every prognosis is connected to a certain risk. As is well known, changes in programming depend on technological progress, and precisely at this moment technologies are being given a genuine boost, and even revolutionary change, in development. There are, however, some assumptions. Without being able to point them out concretely, specialists believe that innovations in the field of programming will have a global nature. First of all, the style of programming will be basically changed. Thanks to the widespread application of improved program systems, programming will be accessible to program users. The program writing will be automated, for the most part, and programmers will formulate queries without exact algorithmic description. Natural languages will find broad application. As far as program errors are concerned, there is no need to speak of them--there will not be any.

SESOR Unit

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 6

[Text] This is a program product designed for standardization of operating system requests and information retrieval, which makes the otpimum use of operating and disk memories in the EDPM's. It consists of procedure software oriented toward system programmers and keyboard operators in information computing centers and can be used by the consumers as well. The above software can be divided into five groups:

--preparation of information carriers. Magnetic carriers initialization software belongs in this group;

--system maintenance. This includes software catalog and data carrier contents, assigning of alternate tracks on magnetic disks, and expanding the system initialization standard software, error detecting on magnetic disks, erasing a certain data set or library data division;

--data set maintenance. It includes the following software: allocation, copying, erasing, and erasing of the data set, and also maintenance software for the library data set;

--magnetic tape and magnetic disk maintenance. Here we find software for storage and restoration of magnetic disk contents and recording of magnetic tapes;

--additional software. This is designed to provide maintenance during the functioning of the system.

The SESOR unit is applicable to all Uniform Series EDPM's; in order to operate it, a 64 kilobyte portion of the operating memory is needed. The operating system is OS/US, and the programming language is ASSEMBLER.

SESOR was implemented at the Central Design and Program Library and is distributed by it under the number APP 143. It was developed by the Interprogram Bulgarian-Soviet Scientific Research and Design Institute in Sofia.

COBOL-MS

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 6

[Text] This is a programming system for the compilation and testing of programs written in the COBOL language and designed for mini EDPM's from the MS-4 series. It consists of a COBOL-MS compiling program and an interactive testing system for SID programs. The compiler is made on the basis of the formal description of the ANS-74 COBOL programming language, presented by the Committee of the Confederation for Programming Languages and Data Base (KODASIL).

COBOL-MS, since it is a file system, uses the data control system (DCS) which supplies relative, consecutive, and index-sequential organization of the files. The index-sequential file organization permits the creation of files which contain one basic key, according to which the file is created and maintained, and 254 alternate keys, which will allow only access to the files. An index is created and maintained for each key.

The interactive testing system can operate with machine symbols and symbolic address.

Because COBOL-MS and COBOL-US are actually only different versions of one and the same formal description of the COBOL language, the COBOL-MS compiling program is a convenient facility for transferring programs already developed for US EDPM's to Miniseries EDPM's. We have to keep in mind, however, that the COBOL-MS can be used only with systems which have a data processing system (DPS) installed and use the SORT sorting program.

The COBOL-MS programming system works with the DOS RV-B operating system. It was developed by the Interprogram Bulgarian-Soviet Scientific Research and Design Institute and is distributed by the Central Design and Programming Library in Sofia under number APP 120.

RINTER Software Set

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 6

[Text] The RINTER software set represents an original system for expanding the interactive capacities for working with EDPM's. It is essentially a continuation and development of the well-known SINTER system; this development has gone forward in three directions:

--adding new data processing commands;

--joint operation of two EDPM's, one of which operates in an interactive mode, and the other in package mode;

--linking SINTER to other teleprocessing systems which makes possible the use of the same network.

RINTER accomplishes the above-mentioned development of SINTER by supplementing its command language with two new groups of commands. The first group increases the possibilities for data processing during operation in the interactive mode. In addition it facilitates the use of the operating system resources by the user. The second group establishes connections between two EDPM's when separate disk devices are available. Thus it is possible for a job created in the interactive mode in one of the EDPM's to be transferred to another machine operating in the package mode.

The connection of SINTER with other teleprocessing systems makes the use of terminals and equipment more effective. And the new possibility created by RINTER for joint operation between SINTER and the SUIP type systems allow

switching over terminals from one system to other systems and vice versa with the help of user commands only.

RINTER is applicable to US EDPM's; for this purpose, only 512 kilobytes of operating memory and the OS/US operating system are needed.

The RINTER was developed by the Interprogram Bulgarian-Soviet Scientific Research and Design Institute and is distributed by the Central Design and Programming Library under the number APP 85.

ALPHA 10

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 6

[Text] The ALPHA 10 package of application programs for EDPM's is designed for automated data base creation and maintenance of a prebank processing automated system. It consists of two subsystems--a primary document processing system (PDPS) and a data base maintenance system (DBMS). Together with the SIOD-30S package of application programs, the ALPHA 10 forms a computing complex for data base automated creation and maintenance of the Automated Control and Maintenance System.

Within the above complex, the PDPS processes information that has been entered with the primary bank documents, such as: description of documents and creation of a dictionary/catalog for document description, information input and control, data transformation, sorting, merging, selection, and so forth, generation of output format documents, adjustment of user data transformation algorithms. The PDPS can also be used independently from the DBMS for the purposes of network planning, processing of files which are not being maintained by the data base control system, and others.

The DBMS represents a superstructure in relation to the application programs package of the SIOD 3/OS and expands its possibilities. Creating and maintaining a data base is achieved through their joint use. In addition, the DBMS offers possibilities for adding records to the main and chain files, for printing procedures, and so forth.

For the ALPHA 10 application programs package, a Uniform Series EDPM is needed, one that has a 256 kilobyte memory, an OS operational system, version 4.0. The program language is ASSEMBLER.

ALPHA 10 has been adopted by the Factory for printing plates in Ruse. It has been developed by the Bulgarian-Soviet Scientific Research and Design Institute and is distributed by the Central Design and Programming Library under the number 113.

BETA 4

Sofia TEKHNICHESKO DELO in Bulgarian 3 Dec 83 p 6

[Text] The BETA 4 application programs package is designed for automation of the basic functions for operating control and of several functions of

technical and economic planning at enterprises whose production is classified, which work on the order system. It is especially effective in the production of single and limited series items. With its help, it is possible to automate data processing for information retrieval and management decisionmaking, for long-term, middle-term, and operative planning, with required production capacity data, clients' orders, and technological sequence of operations.

BETA 4 consists of separate interrelated program units which perform the following functions:

--creation and maintenance of file "parameters," "job centers," "working time fund," and "orders";

--long-term planning of orders;

--planning the staffing of "job centers";

--equalization of the staffing of "job centers";

--creation of "current orders" files;

--planning the release of orders;

--creating a calendar plan schedule and prognosis of the terms for executing current orders;

--printing the results of planning.

A Uniform Series EDPM with 100 kilobytes of operating memory is necessary for operating with a BETA 4 APP. The operating system OS/US 4.0, or more recent versions, is used. The program language is ASSEMBLER.

BETA 4 has been developed by the Interprogram Bulgarian-Soviet Scientific Research and Design Institute and was adopted by the Central Machine Building Institute in Sofia. It is distributed by the Central Design and Programming Library under the number APP 144.

12334
CSO: 2202/6

NEW ACADEMY OF SCIENCES INSTITUTE FOR SEMICONDUCTOR PHYSICS ESTABLISHED

Frankfurt/Oder NEUER TAG in German 23 Dec 83 p 1

[Unattributed article: "A New Center for Semiconductor Physics"]

[Text] The Institute for Semiconductor Physics of the GDR Academy of Sciences was established yesterday with ceremonial proceedings in its new building on Frankfurt's Walter-Korsing Street. In the presence of the members of the SED Central Committee--Jochen Hertwig, first secretary of the SED district directorate, Prof Hannes Hoernig, Central Committee department chief, and Dr. Horst Klemm, first secretary of the SED kreis directorate for the Academy of Sciences of the GDR--the academy's president Prof Dr Werner Scheler, also a member of the SED Central Committee, conducted the constituting of this important scientific institution.

Together with the leading scientists of the new institute, the ceremony was also attended not only by other members of the secretariat of the district directorate but also by Siegfried Sommer, chairman of the district council, Dr Josef Morgenthal, deputy minister for electrical engineering and electronics, Siegmund Hawlitzky, first secretary of the SED Frankfurt/Oder kreis directorate, Chief Mayor Fritz Krause, and Elmar Sommer, works manager of the Frankfurt/Oder Semiconductor Works. Prof Dr Werner Bertoldi was appointed as director of the Institute for Semiconductor Physics. After accepting the appointment certificate, he affirmed that his team will make good use of the extraordinarily favorable working conditions in Frankfurt/Oder for great scientific achievements, for the purpose of the general strengthening of the GDR.

With its new home for semiconductor physics, on the eve of the 35th year since the founding of the GDR this district capital has been given its first academic facility for basic research, and with this it further projects its image as a center for microelectronics in the GDR. In his address, Prof Dr Werner Scheler called the establishment of this institute an important step in attaining in the most effective way, through the territorial interrelations, the cooperation between research and production which is indispensable to a good pace and quality in science and technology. This is completely in line, he said, with the economic strategy of the SED decided on by the Tenth Party Congress, whose requirements for the sciences were reinforced anew by the seventh session of the Central Committee.

During a tour through the new building, the guests were given a glimpse into its modern scientific facilities, which provide excellent opportunities for solving physics and physico-technical problems involving processes and components. In this connection, it was emphasized repeatedly by Prof Dr Bertoldi and his colleagues that there have been sound and fruitful relations with the Frankfurt Semiconductor Works for quite some time now, for the purpose, among other things, of working out long-range research strategies and jointly making use of high-quality equipment and libraries.

The first secretary of the SED district directorate coupled his greetings and congratulations to the institute's team on the occasion of its taking possession of its new home with the recollection of the great traditions of intellectual life in this city on the Oder, where for centuries, as is known, the "Viadrina" University founded in 1506 had made a name for itself on an international level with its important scientific achievements. "These days, as a district capital Frankfurt/Oder must meet even far more the challenge of being a center of political, intellectual, scientific, and cultural life--a task which must be fulfilled on a continually increasing level," declared Comrade Hertwig further. This expectation was likewise emphasized by Chief Mayor Fritz Krause and by works manager Elmar Sommer in their addresses.

12114
CSO: 2302/16

REPORT ON USES OF MKF-6M CAMERA ABOARD SOVIET SALUT 7

Neubrandenburg FREIE ERDE in German 2 Jan 84 p 5

[Unattributed article: "Tracing the Secrets of the Earth"]

[Text] More than 4,000 photographs of specified points on the earth from the spacecraft Salut 7 have given information useful for a concerted search for mineral resources and for the further cosmogeological mapping of the territory of the USSR. The cosmonauts Vladimir Lyachov and Alexander Alexandrov have made more than 3,000 photos with the multispectrum camera MKF-6M. In addition to these, about 1,000 pictures have been taken with the topogeodesy device Kate-140. The bulk of this information had reached earth by means of the return vehicle Kosmos 1443, although a portion of it had been transmitted to the ground stations even during the flight of the orbiting space station.

The photos from space have been helpful, for example, in the further exploration of western Siberia, where the richest petroleum and natural gas deposits in the USSR are located. Since the flight, Soviet geologists have named a certain soil structure in the south of Siberia "Kosmitshezkaya" in recognition of the work of the cosmonauts. But the job of the cosmonauts includes more than scouting for deposits of mineral resources. With the help of this information from space, Soviet scientists are striving to unlock other secrets of the structure of the earth down to its core.

The photographs and photoradiographic surveys of the earth were more comprehensive in the flight of the orbital station Salut 7/Soyuz T9 than in any previous flight. Also involved in this were meteorological satellites, a number of airplanes, and stations on the ground and on ships and floating platforms. In this endeavor the focal points were the Black Sea, the Caspian Sea, the southern Ukraine, the area of Krasnodar, Central Asia, the far east of the USSR, and also Cuba and Mongolia. Soviet scientists have calculated that with this photographing from the earth orbit of the orbital stations, a job is accomplished within 5 minutes which would otherwise take about 80 years if the pictures were taken from airplanes or by teams of geologists.

Through the combined action of the multispectrum camera MKF-6M with the multichannel spectrometer complex MKS-M--which was used for the first time in Salut 7 and which was likewise developed in the GDR with the substantial

involvement of the Neustrelitz satellite ground station--it proved possible to analyze and transmit to the earth many photographs even during the flight. In biological experiments, cosmic influences on more highly developed plants and microorganisms, changes in the chemical structure of biopolymers, and the emergence of homogenous structures in gels were investigated. With the electrophoresis device "Tauris," for the first time especially pure protein was isolated from the membranes of influenza viruses, which could form the basis for a new vaccine.

Another special feature of the most recent space undertaking was the use of the module Kosmos 1443 as a space shuttle; it carried 2,780 kilograms of cargo and 3 tons of fuel into orbit, and its return vehicle brought 350 kilograms of research material back to earth.

12114
CSO: 2302/17

RADIOACTIVE ISOTOPES USED IN INDUSTRY, ENERGY RESEARCH

East Berlin PRESSE-INFORMATIONEN in German No 1, 3 Jan 84 p 5

[Article by Prof Dr Hans-Guenther Koennecke, Central Institute for Isotope and Radiation Research, GDR Academy of Sciences: "Radionuclides Help Optimize Production Processes"]

[Text] In our national economy, radioactive isotopes or nuclides are being used increasingly to investigate the behavior of material flow in closed industrial systems without disturbing or interrupting the operation of the facilities--for example, that of brown coal in the combustion process or that of chemical substances. They are chosen in such a way that no radioactive product is generated, nor can anyone be endangered by radiation.

On the whole, radionuclide technology offers new opportunities for analyzing, optimizing, and regulating industrial equipment and processes. Such analyses provide information on the efficiency of processes under conditions found in large-scale industry, about the level of technology reached by the particular equipment, and on the efficient use of energy and materials.

At present the work of the Central Institute for Isotope and Radiation Research of the GDR Academy of Sciences is concentrated on the application of radionuclides to the production of energy from brown coal and to processes in the chemical industry, in water management, and in the construction field. Here scientists are interested in contributing to the optimization and streamlining of production by means of a rapid transfer of research results.

A Longer Service Life for Machinery

For example, at the Boxberg Power Plant VEB, the largest brown-coal based energy producer in the GDR, the process stages of in-the-mill drying, pneumatic coal transport to the firebox, combustion, and ash separation in a 250-megawatt power-station unit were investigated for the first time in 1983 by means of radionuclide technology. Moreover, special methods of isotope technology made it possible to quantitatively determine the wear or erosion on important equipment parts, and in fact as a function of the

operating regime. On this scientific basis, it proved possible to deliberately increase the service life of specific mechanical units.

Another example found in our economy: Isotope methods are also being successfully used for the modernization of such basic assets as sewage and drinking-water purification plants, such as at the sewage treatment plant of Jena-Zwaetzen. By these means the efficiency of individual phases of the sewage-treatment process have been determined. The scientific investigations of the flow conditions in the reservoir make it possible, for example, to make deductions on how to obtain a higher purification action. From the measurements based on radioactive isotopes, conclusions can also be drawn as to the optimal designing of such facilities.

Such fruitful cooperation requires constant exchanges with one's colleagues regarding one's particular opportunities and tasks and with respect to new economically promising viewpoints. In this connection, for quite some time now user conferences with colleagues from the industry organized jointly with the Chamber of Technology have proved a success.

Joint Tasking Work Books [Pflichtenhefte]

At these user conferences, which are again being held in 1984 as well, in the course of our presentation of the opportunities of isotope technology for the rationalization of production processes the representatives of the industrial enterprises explain their problems in optimizing their production phases. Then from the results of these get-togethers there are detailed discussions about tasks in problem-solving talks and special consultations with industrial partners, and these tasks are written down in joint tasking work books, with the inclusion of concrete dates for the separate tasks. In that way, we ensure a close and collective cooperation, which is a prerequisite for the transfer of research results into practice. Such cooperation allows us the time needed for methodological preparation work on the development of specific techniques, and at the same time permits the proper incorporation of the experiments into the particular production facilities.

The interdisciplinary cooperation of chemists, physicists, process engineers, and project planners, from the planning of the work up to its realization, has proved most successful. This not only has paid off in terms of the increased productivity of industrial equipment and processes, but has also encouraged high scientific and process-engineering levels in our work. Thus, in 1983 about 50 scientists just in the field of isotope applications alone at our Central Institute applied for patents on 43 different inventions. The reasons for this abundance of patents, which lies substantially above the national average, lie above all in the strongly applications-oriented character of our research as well as in the thorough-going utilization of the patent-free areas existing in this field.

The results obtained so far for optimizing or streamlining facilities and processes with the aid of isotope technology are not yet all that can be achieved, and indeed many other technologies can be analyzed and optimized in this way. Our solutions have been possible only because the scientists of our institute are constantly prepared to get directly involved in the production facilities from time to time.

COMMISSIONER BRIEFS GROUP ON PROS, CONS OF GOVERNMENT MICROELECTRONICS PROGRAM

Budapest OTLET in Hungarian 1 Sep 83 p 4

[Text] At a recent section meeting of the industrial branch, Mihaly Sandori, government commissioner for the microelectronic program, said that Hungary was to lay the foundations for Hungarian microelectronics in 2-2.5 years through a 4 billion-forint investment. Although the program is being supported by the Communist Youth League [KISZ], the trade unions and numerous young specialists, fulfillment is beset by many obstacles. This is partly because Hungary suffers a 400 percent lag in this field as compared to the developed European countries. Should the government program be implemented in full, Hungary will be able to fabricate 8-10 of the nearly 8,000 types of microelectronic parts used by industry. By circa 1985, the country should be able to supply one quarter of the auxiliary substances required and thus be less at the mercy of capitalist suppliers. Despite this, Hungary will remain at a disadvantage because of the embargo policy although this could actually rebound to its advantage by stimulating native resourcefulness and inventiveness.

Although secretiveness between East and West is understandable, the meeting found it baffling, at the least, that Hungary has no access to descriptions, specifications of socialist products. The answer to this riddle is a shortage of prospectuses. Of interest to the audience was the statement that non-capitalist produced processors now used in Hungary will soon have to be discarded, because Hungarian made processors function better. The latter are not being used domestically at present because they are in short supply and because international division of labor decrees otherwise. However, the commissioner ruled out extensive sales of processors on the international market.

He also said that it paid Hungary to make and sell microelectronic products because the cost of Hungarian skilled labor is very low compared to the cost of unskilled labor. Hungary cannot follow the practice of Holland which, although it has natural endowments similar to Hungary's, considers microelectronic products such as software as raw materials because Holland has long-standing traditions in the field of electronics and has greater material resources. Sandori revealed that a Dutch-Hungarian joint enterprise is to be established soon for the sale of microelectronic products.

When asked why three different Hungarian firms developed personal computers, Sandori replied that there were actually six, and that it was an entirely

superfluous effort because production of Hungarian computers of this type will not be economically rewarding in the near future. He added that [to] date, the CEMA countries have failed to come up with a package that can compete with the very cheap Western ones now on the market.

Asked whether the personnel required for microelectronics training will be available, the commissioner said that by the end of the 80's there would be 3,000 instructors to train skilled workers.

Realization of the entire program, he felt, is based on faith and hope. Though lacking a past, there is a future for Hungarian microelectronics.

CSO: 2502/27

AUTOMATION, MICROELECTRONICS, AUTOMATIC DATA PROCESSING ACHIEVEMENTS

Bucharest REVISTA ECONOMICA in Romanian No 52, 30 Dec 83 pp 14-15

[Article by Aurel Davidoviciu, director of the Research Directorate of the Central Institute for Management and Data Processing]

[Excerpts] Computerized machines and systems, elements of the new industrial revolution. Impact of computers on production forces and economic structure. Industrialization of software writing. Microprocessors and "mechatronics." Industrial robots, an expression of today's technical progress.

Beginning with the fourth five-year plan, which--consequent to the orientations established by the Ninth Congress of the RCP--launched the Romanian economy on a new course of development guided by efficiency criteria and supported by the extensive introduction of scientific and technical progress, our country is devoting increasing attention to advanced techniques and technologies, among which are cybernetics, data processing, and microelectronics; during the current five-year plan, automation, computer technology, and data processing are among the advanced technology branches whose development has been assigned a high priority, determining as they do, the modernization and expansion of new technologies throughout the economy. The electronics industry is thus striving to develop the production of industrial electronics equipment, automation systems, and computer technology, new types of professional electronic components with a large number of elements in their structure, microprocessors, and so on.

The creation of a national Romanian computer technology industry, as a basic element for the broad introduction of data processing, cybernetics, and complex automation into the economy, began in 1967-1968 following the innovational, revolutionary concept of the secretary general of the party, Nicolae Ceausescu. This industry has presently entered a phase of maturity, with its production satisfying to an increasing degree the needs and demands of domestic users, not to mention the exportations that have been started in recent years. Today, we are manufacturing medium-high capacity computers, minicomputers, management and process microcomputers, as well as a broad range of peripherals, terminals, graphics systems, and so on; more than 90 percent of this production consists of equipment designed in Romania. During the past

12 years, we have also created and consolidated a unified network of data processing units which can provide--as confirmed by many prestigious results--an efficient use of computer technology in the most diverse branches and sectors of activity.

As our country moved to the mass production and dissemination of minicomputers and especially microcomputers into the economy, a specific aspect--whose essence is often insufficiently well understood, with negative consequences on the efficient utilization of computer equipment--is the matter of the programs that operate this equipment. While the spectacular evolution of the equipment in terms of technical performance is accompanied (due to miniaturization and automated mass production of microelectronic components) by a rapid reduction in its costs, the production of programs--a mental effort that contains a large amount of highly qualified human activity--tends to significantly increase the total cost of an application or computer system. For instance, while the cost of programs represented only about 10 percent in 1950, it grew to about 50 percent in 1980, and is expected to reach about 90 percent in 1990.

This problem could be solved by a gradual shift to advanced methods and technologies in the formulation of computer programs, thus assuring high labor productivity and product quality. The transformation of program writing into an industrial type of activity also requires a specific economic mechanism, which in defining data processing products as industrial goods and products, would establish appropriate technical-economic indicators for their formulation, distribution, and maintenance, as well as technical quality standards, regulations for their circulation, and so on. The gradual industrialization of this activity will also have a positive effect on encouraging the exportation of such products.

The documents of 12th Party Congress and the recently adopted program for greater labor productivity growth, indicate the significant role that will be played by more extensive mechanization and automation, and by the use of industrial robots and microprocessors.

At present, the major limiting factors in the development of microprocessor utilization are no longer the identification of the types of application in which they might prove useful, but the ability of designers to formulate the actual applications, as well as the possibility of procuring microprocessors. According to the provisions of party and state documents, our country is expected to soon undertake the industrial manufacturing of microprocessors.

Our country has obtained recent, prestigious results in building industrial robots such as REMT-1 and 2 (being used a the Electromotor enterprise in Timisoara), RIP 6,3 (adopted and presently being introduced into mass production), RIS 25, RIP 63, and so on--robots that can be programmed through instructions and controlled by Romanian mass produced equipment (CORAL 4001 minicomputers and ECAROM 800 microcomputers).

The remarkable results obtained by scientific research and industrial production in our country's electronics, automation, and data processing, or in short, in the industrial practice of cybernetics, are placed in the service of higher labor productivity, and of the material and spiritual well-being of all members of society. We are certainly far from having sufficiently, extensively, and intensively exploited the exceptionally high possibilities opened by these conquests of the human mind; we still have to perform many efforts of scientific research, technologic development, introduction of technical progress, education, and improved professional training, as well as organizational and financial efforts which will fully contribute to the development of our socialist society.

11,023
CSO: 2702/2

MEMORY SUBSYSTEM FOR COMPUTERS PRODUCED

Bucharest REVISTA ECONOMICA in Romanian No 40, 7 Oct 83 p 3

[Article by C. E.]

[Text] Among the new achievements of computer technology presented at the current Bucharest International Fair, is the subsystem intended to equip the high capacity computer systems manufactured in Romania, FELIX-256, FELIX-512, and so on. It has a transfer rate of 200 Kbits/sec, a recording density of 1600 bpi-PE, and a tape speed of 125 ips (3m/sec).

This new original creation of the Bucharest Research Institute for Computer Technology offers great advantages in maintaining tape motion specifications through optimum path and air cushion guidance. The metal-coated magnetic heads and guides assure minimum tape wear. The tape is moved by a single capstan system, and the path is configured to allow shock-free stops and starts. The tape is maintained against the capstan by vacuum, while the tape transport system and guides are of the IBM-type. Long vacuum columns are provided with additional pockets to attenuate vibrations and improve dynamic alignment.

Reels are controlled by a digital two-position servosystem operated with semiconductor devices, characterized by very good transient response and optimum stabilization. The capstan servosystem is characterized by a very high torque/inertia ratio and is controlled by an analog servosystem, assembled compactly from semiconductor devices, and provided with troubleshooting and adjustment facilities. The write/read block is equipped with a read preamplifier mounted near the magnetic head. The tape is loaded semi-automatically and unloaded automatically, with position indicators being detected by integrated photosensitive devices.

Power supplies are stabilized and use integrated voltage regulators with low power consumption. The formatter, which has a standard industrial interface, is logic-compatible with similar products. The interface is radial, allowing each magnetic tape unit to be connected independently. For maintenance, it is thus possible to disconnect any tape unit without affecting the operation of

the remaining units. The formatter is tested on-line with a specialized tester built with FPLA circuits. Testing can also be carried out through automatic data multiplexing. The five cards are interchangeable, thus assuring easy troubleshooting.

The technical quality and high performance of the MBM-125 magnetic tape memory subsystem make it fully compatible with similar products of companies established in this field.

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